M. Heude having allowed me to take the description of his bird, which is unique in his collection, I hasten to send it to you, and regard it as my duty to dedicate to him this new species, under the name of *Paradoxornis Heudei.*

Total length	18 centims.
Length of the tail	$9\frac{1}{2}$ „
„ of the closed wing	57 millims.
„ of the tarse	24 „

Bill yellow; feet of a yellowish grey; claws grey.

Tail long, much graduated, with the feathers black, terminated by a broad white spot; the median feathers unicolorous yellowish grey.

Wings short and round, with the quill-feathers black, surrounded by a margin of reddish grey; lesser coverts of a cinnamon fulvous, as well as the feathers of the insertion of the wings.

Stalks of the rectrices and remiges black above, white beneath.

Head grey in the middle; two broad black streaks above the eyes, like eyebrows; neck grey; parotic region of a rosy grey; back rosy grey, with a few elongated brown spots; rump reddish yellow.

Throat white; breast of a vinous rosy colour; flanks reddish; middle of the belly whitish, as are also the subcaudals.

M. Heude killed this pretty bird in December 1871 among the reeds (*Phragmites*) which border a lake of the Kiang-Sou; these it traverses in little flocks. According to that naturalist, it possesses an agreeable voice and has the climbing (or rather clinging) habits of the allied genera—*Comptes Rendus*, June 3, 1872, p. 1449.

Investigations on Fossil Birds. By M. A. Milne-Edwards.

At the moment when my investigations upon fossil birds approach their termination, and before the last part is given to the public, I will ask the Academy's permission to explain in a few words the results at which I have arrived during these studies, which have lasted fully twelve years.

I believe I have demonstrated, by the examination of the bones which have been found in the recent deposits in the Mascarene Islands, and which belong, for the most part, to extinct species, such as the dodo, the solitaire, the *Aphanapteryx*, *Fulica Newtoni*, large Parrots, &c., that these islands have once been part of a vast extent of land, that these lands by little and little and by a slow depression have been hidden under the waters of the ocean, only leaving visible some of their highest points, such as the islands of Mauritius, Rodriguez, and Bourbon. These islands have served as a refuge for the last representatives of the terrestrial population of these ancient epochs; but the species, confined in too limited a space and exposed to all causes of destruction, have disappeared by degrees; and man has in some measure aided in their extinction.

Madagascar evidently was not in communication with these islands; for when Europeans visited them for the first time, they did not find

there any Mammalia, with the exception of some large bats; none of those remarkable Lemuridæ peculiar to the fauna of Madagascar existed in the Mascarene Islands. The study of fossil birds leads to the same result; and the three species of *Æpyornis* which M. A. Grandidier and I have been able to recognize among the fossils collected in the swamps of the south-west coast have enabled us to establish the relationship which connects these birds with the *Dinornis*, the *Palapteryx*, and *Aptornis* of New Zealand. All these species belong to the same zoological type, and make us feel that at a more or less remote epoch there may have existed some communication between these lands so far away from one another; perhaps groups of islands, now submerged, formed intermediate stations, of which unfortunately we have now no trace.

In France, from the earliest age of man, we remark sometimes in superficial deposits, sometimes in caverns, fragments of birds which furnish us with valuable indications of the climatal conditions of that epoch. Some of these species have now entirely disappeared; others, in considerable numbers, have by degrees retired towards the north—for instance, the grouse and the great hawk owl, which then were extremely common in these countries. Their presence is most significant; for even supposing, according to some naturalists, the reindeer is only found fossil in France because it had been introduced by the Finnish population, we cannot invoke the same explanation for birds which have never been domesticated. Lastly, we also find in our caves a great number of species identical with those which now inhabit temperate Europe—among others, the cock, which was supposed to be a native of India, but which, on the contrary, must have been a contemporary of the first ages of man.

It is especially the Middle Tertiary deposits which have furnished me with a rich harvest. Thus in the Department of the Allier I have recognized the presence of about 70 species belonging to very various groups, some of which no longer belong to our fauna. Parrots and Trogons inhabited the woods; swallows built in the fissures of the rocks nests in all probability like those now found in certain parts of Asia and the Indian archipelago. A secretary bird nearly allied to that of the Cape of Good Hope sought in the plains the serpents and reptiles which at that time, as now, must have furnished its nourishment. Large adjutants, cranes, flamingoes, the *Palælodi* (birds of curious forms, partaking at once of the characters of the flamingoes and ordinary Grallæ), and ibises frequented the banks of the watercourses where the larvæ of insects and mollusks abounded; pelicans floated in the midst of the lakes; and, lastly, sand-grouse and numerous gallinaceous birds assisted in giving to this ornithological population a physiognomy with which it is impossible not to be struck, and which recalls to one's mind the descriptions which Livingstone has given us of certain lakes of southern Africa.

The list I have given of the birds whose existence I have ascertained in the part of the Miocene lakes the alluvium of which has formed the deposits of St. Géraud le Puy, of Vaumas, &c., indicates

the relations in which the different groups of this class of vertebrates lived. Whilst some of them are extremely common, there are others which are only found, so to speak, accidentally, and which are only represented in my collection by a single bone or only a few bones. The species most frequently met with are the water-birds: thus the ducks have left numerous remains; the cormorant is only found at certain places. Evidently at that time, as now, birds had preferences for certain places, certain rocks, &c., from which they departed but little. The little diver (*Colymboides minutus*) is less abundant than the gulls, of which two species, *Larus elegans* and *L. totanoides*, exist in profusion.

It is the same with some of the small shore-waders belonging to the genera *Totanus* and *Tringa*, whilst *Elorius* and *Himantopus* are represented by few individuals. I have found numerous bones of the ibis, and in particular of the *Palælodus ambiguus*; the four other species of the latter genus are by no means so common. Thus out of two hundred bones of these birds hardly one will turn out to be of *P. crassipes*, *P. minutus*, *P. gracilipes*, or *P. goliath*. The portions of the skeleton of the flamingo are rarely found entire at St. Géraud le Puy; whereas at Coumon and Chaptuzat, on the contrary, they are well preserved. I have only once met with the bones of the adjutant; they belonged to two young specimens, and were associated in the same excavation filled with sand. The cranes are rare; their bones are almost always broken and often injured by the teeth of rodents, as if they had lain for a long time on the bank before being carried to the bottom of the lake. The rails, the gallinaceous birds, the pigeons, the sand-grouse, the passerine birds, the raptores, and the parrots have left but few traces of their existence. These birds, from their mode of life, did not remain continually on the shores of the lakes or watercourses; their remains might be eaten or destroyed at once, and it would need a concurrence of exceptional circumstances for them to be transported by the streams into the alluvial deposits of the lakes: thus I had explored these deposits for more than ten years before I met with a single bone of a parrot, sand-grouse, secretary bird, or of several of the raptores; and some, of which I had collected the remains a long time ago, have not appeared since.

All the bones of birds collected in the Miocene beds of Weissenau, in the basin of Mayence, that I have been able to examine, present a complete resemblance to those of the Department of the Allier.

The ornithological population of the celebrated deposit of Sansan, in the Department of the Gers, presents another character; not one of its representatives is found in the lacustrine deposits of the Bourbonnais and the Auvergne: and although the greater part of the species belong to families at present existing in our fauna, not one is known to be actually living, and several of them present characters sufficient to constitute new genera.

I have discovered there a parrot of a more slender form than that of the Allier, and I have designated it by the name of *Psittacus Lartetianus*, to attach the name of my regretted master and friend to one

of the most interesting species that I have ever found in this rich deposit. Some gallinaceous birds of a large size, and in this respect hardly inferior to the peacocks and true pheasants, also inhabited the shores of the little lake, where the deposits accumulated which now form the hill of Sansan; numerous passerine birds, resembling the Bengalis and Senegalis, frequented the margins of the waters; lastly, the number of species was not less than 35, and certainly new excavations will not fail to make known more.

The marine faluns of the Loire have only furnished me with a few species of birds. I have been able, however, to recognize a cormorant almost as large as that which now lives on our shores, a goose a little smaller than the bernicle, a heron, and a pheasant.

The beds of gypsum in the environs of Paris contain numerous impressions of skeletons of birds; and it is to be observed that the animals of that period deviated more from the zoological forms which exist at the present day. Thus, despite the unwillingness I feel, especially in palæontological studies, to increase the already too large number of generic groups, I have been obliged to form new genera for many among them. Thus the *Cryptornis antiquus* was nearer the hornbills than any known type; *Laurillardia* and *Palægithalus* belong to the order of passerine birds, but were quite distinct from all those now living. The *Palæortyges* are gallinaceous, of the size of a quail, but very different from those birds. *Gypsornis* is the giant of the family Rallidæ; it must almost have attained the size of a stork. *Agnopterus* approaches the flamingoes, although it displays some characters peculiar to itself.

The singularity of the forms of these Eocene birds makes us doubly regret not knowing those of the Cretaceous period. Unfortunately there exist only a very small number of freshwater deposits dating from that period; therefore it is not astonishing that we have as yet discovered only very few traces of terrestrial animals which lived during the deposition of these important strata. Perhaps new zoological forms will be discovered there filling up the immense gap which exists between the Jurassic *Archæopteryx* and the typical birds of the Tertiary epoch.—*Comptes Rendus*, April 15, 1872, pp. 1030–1034.

Migrations of the Graptolites. By H. Alleyne Nicholson, M.D., F.R.S.E., F.G.S., Professor of Natural History and Botany in University College, Toronto.

The author commenced by stating that the occurrence of the same species of marine animals in deposits in distant areas is now generally regarded as evidence that such deposits are not strictly contemporaneous, but rather that a migration from one area to another has taken place; this migration he thought would probably in many cases be accompanied by modification. Applying these principles to the Graptolites, he endeavoured to show in what directions their migrations may have taken place.

He excluded from the family Graptolitidæ the genera *Dictyonema*, *Dendrograpsus*, *Callograpsus*, and *Ptilograpsus*, and stated that the